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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/542,023

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EXAMINER

MATTHEWS, ABRAHAM M

ART UNIT

PAPER NUMBER

1755

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

01/04/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/542,023

Applicant(s)

KOGOI ET AL.

Examiner

Abraham M. Matthews

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13-15 is/are allowed.
- 6) ☒ Claim(s) 1-12 and 16-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 6/15/2006
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1,2,10 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent No. 5,256,616 to Heller et al.

Regarding Applicants' claim 1, Heller et al. disclose beads (i.e., larger particle) having an exterior surface that is at least partially coated with photocatalytic materials (smaller particles) which have diameters on the order of 0.03 to 0.2 microns, and said coated beads having an equivalent diameter less than about 200 microns (Heller et al., column 2, lines 17-28, column 2, line 66 to column 3, line 5., column 3, lines 64-66, and column 5, lines 18-23).

Regarding Applicants' claim 2, Heller et al. disclose that the photocatalytic coating materials, i.e., the "smaller particles" of Applicants' recitation of claims 1 and 2, comprise titanium dioxide (Heller et al., column 3, lines 22-25).

Regarding Applicants' claim 10, Heller et al. disclose spherical coated beads which may comprise a plastic material (i.e., a resin) such as polyethylene or polypropylene (Heller et al, column 3, lines 43-44, and column 2, lines 22-26). Even though Heller et al. do not disclose the melting points of the disclosed resins, namely, polyethylene or polypropylene, from which said spherical beads are made, the melting points of said resins are well known to be at least 150°C (See MPEP 2112).

Regarding Applicants' claim 11, Heller et al. disclose that organic bead material may be a plastic material such as polyethylene or polypropylene, and that said organic bead material may comprise a protective intermediate layer comprising silicon dioxide or aluminum oxide (Heller et al, column 3, lines 43-46).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-12, and 16-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pub No. US 2003/0181329 A1 by Tanaka et al. in view of US Patent No. 5,256,616 to Heller et al., as applied to claims 1,2,10 and 11 above.

Regarding Applicants' claim 1, Tanaka et al. disclose photocatalyst composite particles of titanium dioxide and a compound inactive as a photocatalyst (Tanaka et al.,

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page 4, paragraph [0053]). Tanaka et al. also disclose an organic polymer composition containing said photocatalyst composite particles (Tanaka et al, page 4, paragraph [0074]). Tanaka et al. also further disclose the BET specific surface area of the photocatalyst composite particles to be within a range from 10 to 300 m²/g (Tanaka et al., page 4, paragraph [0059]), which corresponds to the BET specific surface area of the "smaller particles" contained in the composite particle of Applicants' recitation of claim 1. Using said BET specific surface area of Tanaka et al. and applying standard procedure for calculating average particle diameter from its BET specific surface area, the Examiner calculates that the average particle diameter range of said photocatalyst composite particles disclosed by Tanaka et al. is in the range of 0.009 to 0.3 microns which meets the limitation as to the average particle diameter range of the "smaller particles" of claim 1.

However, Tanaka et al. are silent about the average particle diameter range of the organic polymer composition containing the photocatalyst particles, which corresponds to the average particle diameter of the "larger particle", contained in the composite particle of Applicants' recitation of claim 1.

Nonetheless, Heller et al. , also drawn to photocatalytic materials, disclose coated beads having an equivalent diameter less than about 200 microns, wherein the the surface of said beads is coated with titanium dioxide in a preferred embodiment (Heller et al., column 3, lines 64-68, and column 5, lines 18-24).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have added said average particle range for the "larger particle", as disclosed by Heller et al., to the organic polymer composition containing the photocatalyst particles of Tanaka et al. motivated by the fact that Heller et al. disclose that the size of the coated bead can be made sufficiently small for the sedimentation velocity to be substantially reduced (Heller et al., column 2, lines 46-53).

Regarding Applicants' claims 2 and 3, Tanaka et al., as applied to the rejection of claim 1 above, disclose photocatalyst composite particles and an organic polymer composition containing said photocatalyst composite particles. The recitations of

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Applicants' claims 2 and 3 can be found in Tanaka et al., page 4, paragraphs [0053] and [0054].

Regarding Applicants' claims 4-8, Tanaka et al., as applied to the rejection of claim 1 above, disclose photocatalyst composite particles and an organic polymer composition containing said photocatalyst composite particles. The recitations of Applicants' claims 4-8 can be found in Tanaka et al., page 4, paragraphs [0054],[0064],[0065], and [0067].

Regarding Applicants' claim 9, Tanaka et al., as applied to the rejection of claim 1 above, disclose photocatalyst composite particles and an organic polymer composition containing said photocatalyst composite particles. The recitation of Applicants' claim 9 can be found in the above reference on page 4, paragraph [0061].

Regarding Applicants' claim 10, Tanaka et al., as applied to the rejection of claim 1 above, disclose photocatalyst composite particles and an organic polymer composition containing said photocatalyst composite particles. Tanaka et al., however, are silent about said organic polymer composition ("larger particle") containing the photocatalyst composite particles, wherein the organic polymer composition is a spherical resin particle having a melting point of at least 150⁰ C., as recited in Applicants' claim 10. However, Heller et al., as applied to the rejection of claim 1 above, disclose spherical coated beads which may comprise a plastic material (i.e., a resin) such as polyethylene or polypropylene (Heller et al., column 3 ,lines 43-44, and column 2, lines 22-26). Even though, Heller et al. do not disclose the melting points of the disclosed resins, namely, polyethylene or polypropylene, from which said beads are made, the melting points of said resins are well known to be at least 150⁰C (See MPEP 2112).

Regarding Applicants' claim 11, Tanaka et al., as applied to the rejection of claim 1 above, disclose photocatalyst composite particles and an organic polymer composition containing said photocatalyst composite particles. Tanaka et al., however,

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do not disclose said organic polymer composition containing said photocatalyst composite particles, wherein the organic polymer composition (which corresponds to the "larger particle" of Applicants' claim 11) is comprised of a hydroxide, oxide, or carbonate, which contains at least one kind of element selected from the group consisting of aluminum, magnesium, calcium and silicon, as set forth in Applicants' recitation of claim 11.

Nonetheless, Heller et al, as applied to claim 1 above, disclose that the organic bead material may be a plastic material such as polyethylene or polypropylene. The protective intermediate layer may be, for example, silicon dioxide or aluminum oxide (Heller et al., column 3, lines 43-46). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have added said hydroxide, oxide or carbonate, as disclosed by Heller et al., to the organic polymer composition containing photocatalyst composite particles of Tanaka et al motivated by the fact that Heller et al disclose that, the bead preferably should be protected with an intermediate layer comprising a material which will not allow oxidization of the organic bead material or itself be oxidized by oxygen in a process photocatalyzed by the outer coating material (Heller et al., column 3, lines 38-42).

Regarding Applicants' claims 12 and 16, Tanaka et al., as applied to the rejection of claim 1 above, disclose photocatalyst composite particles and an organic polymer composition containing said photocatalyst composite particles. The recitation of Applicants' claims 12 and 16 can be found in the above reference on page 5, paragraph [0077].

Regarding Applicants' claims 17-26, Tanaka et al., as applied to the rejection of claim 1 above, disclose photocatalyst composite particles and an organic polymer composition containing said photocatalyst composite particles. The recitations of claims 17-26 can be found in the above reference on page 4 and 5, paragraphs [0075],[0076], and [0078] to [0082].

Allowable Subject Matter

Claims 13-15 are allowed. The prior art fails to disclose or suggest a method of producing a composite particle as claimed in claims 13-15, comprising: (a) dry-mixing the smaller particles and the larger particle by a ball mill, characterized in that the dry-mixing is carried out under conditions such that k value as defined by the equation (1): $k = (w_m/w_p) \times d \times n \times t$ is in the range of 50 to 50,000, wherein the parameters of said equation (1) are as defined in Applicants' instant claim 13; (b) mixing, pulverizing and stirring the smaller and the larger particle by a powder-treating apparatus provided with rotary blades, characterized in that the mixing, pulverizing, and stirring are carried out under conditions such that k_2 value as defined by the equation (2): $k_2 = n \times t$ is in the range of 250 to 50,000, wherein the parameters of said equation (2) are as defined in Applicants' instant claim 14; and (c) mixing, pulverizing and stirring the smaller particles and the larger particle by a shaking-type powder-treating apparatus, characterized in that the mixing, pulverizing and stirring are carried out under conditions such that k_3 value as defined by the equation (3): $k_3 = n \times t$ is in the range of 50 to 50,000, wherein The parameters of said equation (3) are as defined in Applicants' instant claim 15.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Abraham M. Matthews whose telephone number is (571) 272-2495. The examiner can normally be reached on M-F 8:00 -4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on (571) 272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AMM


DAVID SAMPLE
PRIMARY EXAMINER